Public Health
Seattle & King County
HIV / AIDS and STD PROGRAMS

HIV Infogram

Information Update on HIV/AIDS
and Sexually Transmitted Diseases
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Update on HIV Transmission and Viral Load

Once someone is infected with HIV, they are infected for life and will always have HIV in their body. Viral load (**see sidebar**) measures the amount of virus active in a person's blood. Results from viral load tests can range from "undetectable" (***see sidebar***) to over a million copies per milliliter of blood. Viral load can change from day to day.

What is Viral Load?

Viral load is a measurement of the number of HIV particles in the blood. Lower numbers mean fewer viruses and less active disease; higher numbers mean more viruses and more active disease.

What is "undetectable" viral load?

"Undetectable viral load" means less virus in the blood than the test is designed to measure (e.g., up to 39 viral copies per milliliter of blood). An "undetectable" viral load does not mean that the person is free of HIV infection.

Effective drugs, taken properly, significantly decrease viral load. Some HIV+ persons believe that taking HAART or having an "undetectable viral load" means that they can't transmit HIV to their sexual partners. [1, 2] That is **not true.**

Our knowledge of how viral load impacts transmission is not complete, but we can say:

1. The higher one's viral load the more likely one is to transmit the virus and the lower one's viral load the less likely one is to transmit the virus.
2. A person with an "undetectable" viral load in the blood is still infected with HIV, can still have higher levels of virus in their genital fluids (especially in the presence of sexually transmitted diseases) and can still infect others.
3. Effective Highly Active Anti-retroviral Treatment (HAART), taken properly, usually significantly decreases the amount of viral load. Despite these lower viral loads, increases in unsafe sexual behavior have actually caused the rate of HIV transmission to rise in recent years.

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Generally, studies show that higher viral load leads to a greater chance of transmission and that a lower viral load leads to a less chance of transmission.

For instance, in a study of couples in Uganda the viral load was significantly higher among HIV-1-positive subjects whose partners became infected with HIV than among those whose partners did not. There were no instances of transmission among the 51 subjects with viral loads of less than 1500 copies per milliliter.[3] Another study that followed 174 couples in Africa determined that higher viral load was one of the main determinants of HIV-1 transmission.[4]

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Viral load tests measure the amount of virus in the *blood;* most transmission is sexual and *sexual fluids* may contain measurable and high virus even when virus in the blood is undetectable. The relationship between viral load in blood and the amount of virus in the genital secretions and semen is complex. People with low viral loads tend to have low amounts of virus in their genital fluids, but important exceptions have been observed.[5] A study from the Women's Interagency HIV Study cohort reports that women who have low levels of HIV in their blood may still have high levels of virus in their genital tracts. One-third of women whose blood viral load was lower than 500 copies/ml still had high levels of HIV in their genital tracts and experienced genital tract viral shedding.[6] Diseases of the genitals causing ulcers or inflammation (e.g., syphilis, gonorrhea, and chlamydia) tend to increase the amount of virus present in genital secretions.

Viral particles capable of causing an infection have been found in the semen of HIV-1 infected men who were receiving highly active anti-retroviral therapy and who had no detectable levels of virus in the blood.[7] Transmissions from persons with undetectable viral load have been documented.[8, 9,]

Effective Highly Active Anti-retroviral Treatment (HAART), taken properly, significantly decrease the amount of viral load. Despite these lower viral loads, increases in unsafe sexual behavior have actually caused the rate of HIV transmission to rise in recent years.

Unfortunately, as more people have benefited from HAART, there has also been a substantial increase in the amount of risky sexual behavior. A study of men who have sex with men in San Francisco showed: (1) that use of HAART among MSM living with AIDS increased from 4% in 1995 to 54% in 1999, (2) that the percentage of MSM who reported both unprotected anal intercourse and multiple sexual partners increased from 24% in 1994 to 45% in 1999, and (3) that the annual HIV incidence rate increased from 2.1% in 1996 to 4.2% in 1999.[10]

Any decrease in transmission risk from lowered viral load seems to be completely offset by higher risk behaviors, resulting in what seems to be an increase in transmissions.

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[6] Kovacs A, Wasserman SS, Burns D, et al. **Determinants of HIV-1 shedding in the genital tract of women.** *Lance*t, 2001. 358(9293): p. 1593-1601.
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[10] Katz MH, Schwarcz SK, Kellogg TA, Klausner JD, Dilley JW, Gibson S, McFarland W.**Impact of highly active antiretroviral treatment on HIV seroincidence among men who have sex with men: San Francisco.***Am J Public Health*. 2002 Mar;92(3):388-394.

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